Algebra 2 Formulas

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Point-Slope Form

$$y - y_1 = m(x - x_1)$$

Midpoint Formula

$$(x_m, y_m) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Slope-Intercept Form

$$y = mx + b$$

Quadratic Formula

$$x = \frac{-(b) \pm \sqrt{b^2 - 4ac}}{2a}$$

Parabola

Axis of Symmetry is $x = \frac{-(b)}{2a}$

Difference of Squares

$$a^2 - b^2 = (a + b)(a - b)$$

Direct Variation

$$\frac{y_1}{x_1} = \frac{y_2}{x_2} \qquad y = kx$$

Factoring Perfect Square Trinomial

$$a^2 + 2ab + b^2 = (a + b)(a + b) = (a + b)^2$$

$$a^2 - 2ab + b^2 = (a - b)(a - b) = (a - b)^2$$

Sum and Difference of Cubes

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Change of Base

$$\log_b M = \frac{\log M}{\log b}$$

Continuously Compound Interest formula

$$A = Pe^{rt}$$

Logarithm

If $y = b^x$, then $\log_b y = x$

Natural Logarithmic Function

If $y = e^x$, then $\log_e y = x$, which is commonly written as $\ln y = x$

Absolute Value

$$y = |mx + b| + c$$

Vertex is $\left(-\frac{b}{m}, c\right)$

Conic Section | **Standard form of Conics**

Conic Section	Center/vertex (0, 0)	Center/vertex (h, k)
Parabola	vertex (0, 0) $x^2 = 4py$ $y^2 = 4px$	Vertex (h, k) $(x-h)^2 = 4p(y-k)$ $(y-k)^2 = 4p(x-h)$
Circle	Center (0, 0) $x^2 + y^2 = r^2$	Center (h, k) $(x-h)^2 + (y-k)^2 = r^2$
Ellipse	Center (0, 0) $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ $\frac{x^2}{b^2} + \frac{y^2}{a^2} = 1$	Center (h, k) $\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$ $\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$
Hyperbola	Center (0, 0) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ $\frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$	Center (h, k) $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$

Arithmetic Sequence

$$a_n = a_{n-1} + d$$
$$a_n = a_1 + (n-1)d$$

Geometric Sequence

$$a_n = a_{n-1} \cdot r$$
$$a_n = a_1 \cdot r^{n-1}$$

Arithmetic Series

$$S_n = \frac{n}{2}(a_1 + a_n)$$

Geometric Series

$$S_n = \frac{a_1(1 - r^n)}{1 - r}$$